

FIG. 1

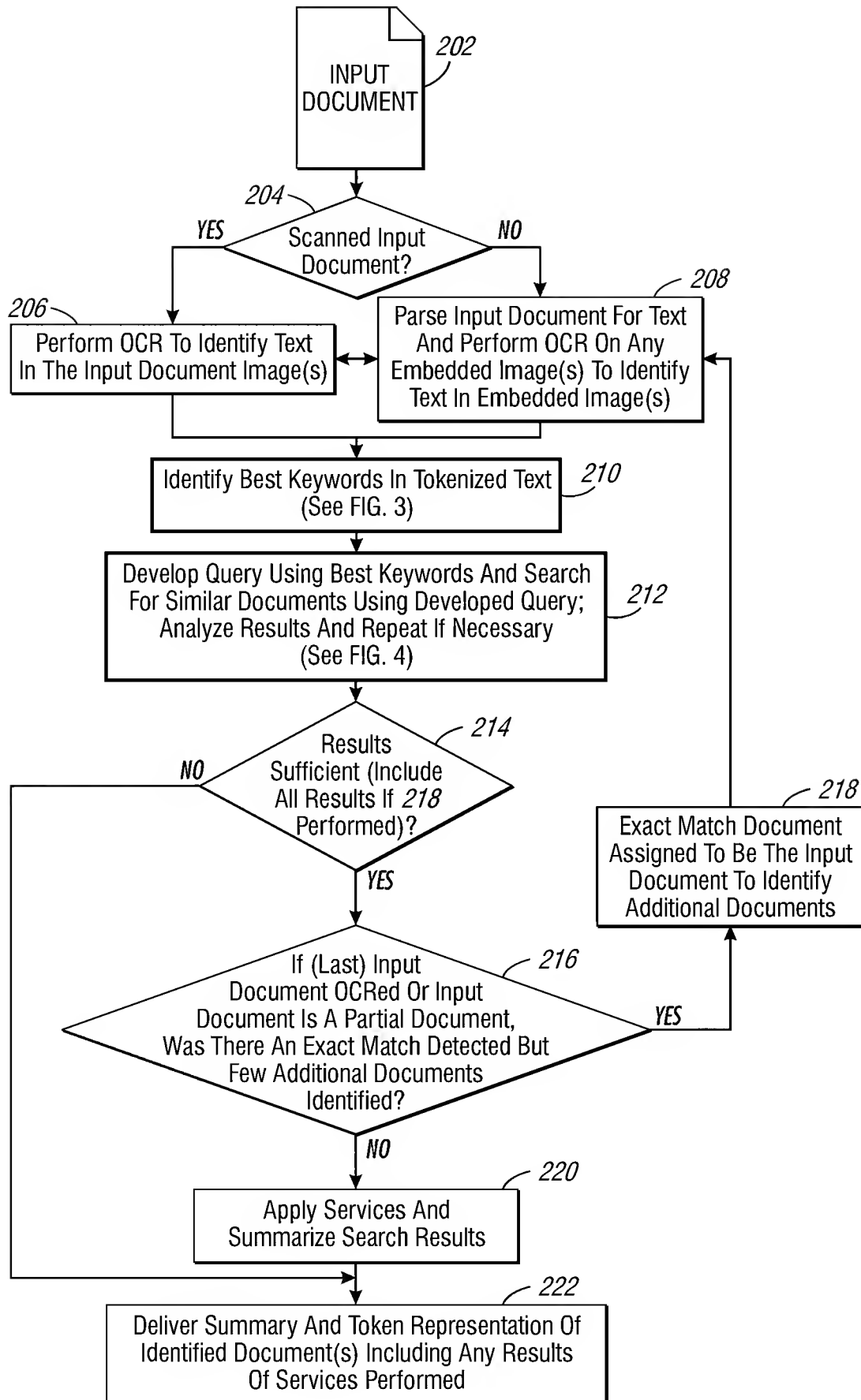


FIG. 2

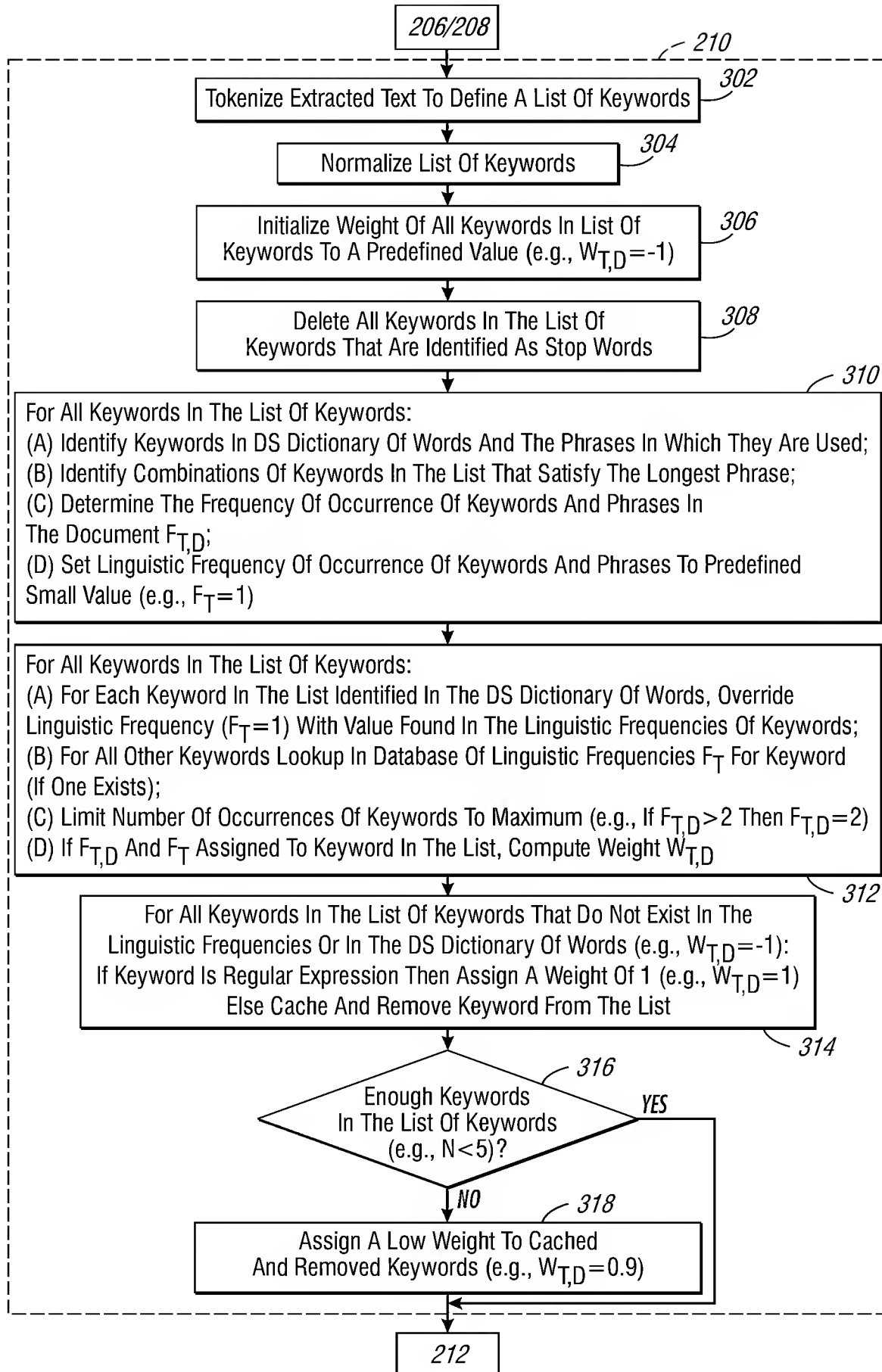


FIG. 3

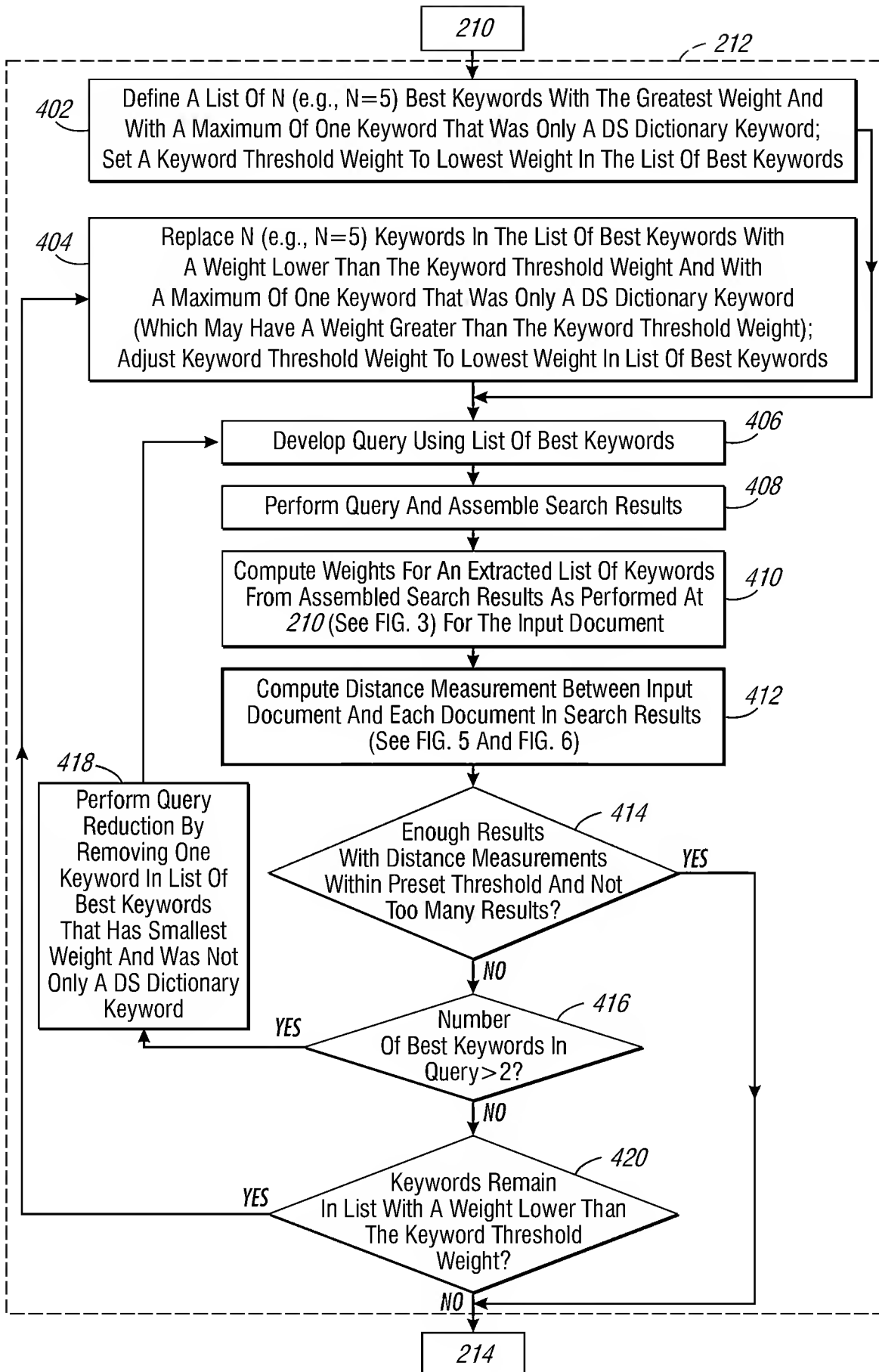


FIG. 4

**CALCULATE\_SIMILARITY [D1,D2]** -calculates the similarity between documents D1 and D2

• Input:

- D1: List of keywords of the input document
- D2: List of keywords of document from search results

• Output:

- Similarity “S”: The computed similarity between D1 and D2

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For the document D1, calculate with the keyword weights of D1:

- unique attributes sum: Sum1 = the sum of the weights of keywords in D1 that do not appear in D2
- total sum: Sum2 = the sum of the weights of keywords in D1
- shared sum: Sum3 = the sum of the weights of keywords in D1 that also appear in D2
- ratio: R = (the number of keywords in D1 not in D2)/(the number of keywords in D1)

502

For the document D2, calculate with the keyword weights of D2:

- unique attributes sum: Sum4 = the sum of the weights of keywords in D2 that do not appear in D1
- shared sum: Sum5 = the sum of weights of keywords in D2 that also appear in D1

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If D1 originates from a hardcopy document, calculate the tolerance ratio “T”:

K = a constant defined by OCR error rate at the keyword level, if no OCR error is detected, K is set to 0

$$T = K * (Sum2 - Sum3)/(Sum2)$$

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Calculate the inclusion ratio “I” (i.e., percentage of keywords from D1 that are in D2):

$$I = (Sum3)/(Sum2) + T$$

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TO FIG. 6

FIG. 5

If  $I > 90\%$  (i.e., if an inclusion is detected, e.g., 90 % of the keywords from D1 are in D2):

Sum6 = **Ordered\_Sum** [D1,D2] - sum of the weights of keywords in D1

with same neighbors in D2 (SEE FIG. 7)

- Calculate ordered inclusion ratio "I2":

$I2 = (\text{Sum6}) / (\text{Sum2})$

if ( $I2 > I$ ) then  $S = I$

else

if (D1 originates from a hardcopy document and  $I2 > 50\%$ )

if ( $R < 20\%$ ) then  $S = I$  else  $S = I2$

else  $S = I2$

else (i.e., if no inclusion is detected):

- Calculate the Jaccard similarity distance measure:

$\text{Sum7} = \text{Sum1} + \text{Sum4} + \text{Sum5}$

$S = (\text{Sum5}) / (\text{Sum7})$

- If  $S > 90\%$  : (a revision is detected, i.e., Jaccard similarity  $S > 90\%$  ; otherwise a related document may be detected)

- Sum8 = **Ordered\_Sum** [D2,D1] - sum of the weights of keywords from D2 with same neighbors in D1

- Calculate ordered similarity:

$S2 = (\text{Sum8}) / (\text{Sum1} + \text{Sum4} + \text{Sum8})$

if ( $S2 > S$ )

if (D1 originates from a hardcopy document)

if ( $S2 > 50\%$ )

if ( $R > 20\%$ ) then  $S = S1$

else  $S = S1$

else  $S = S1$

else  $S = S1$

FIG. 6

**Ordered\_Sum [L1, L2]** - calculates sum of the weights of keywords from L1 with same neighbors in L2

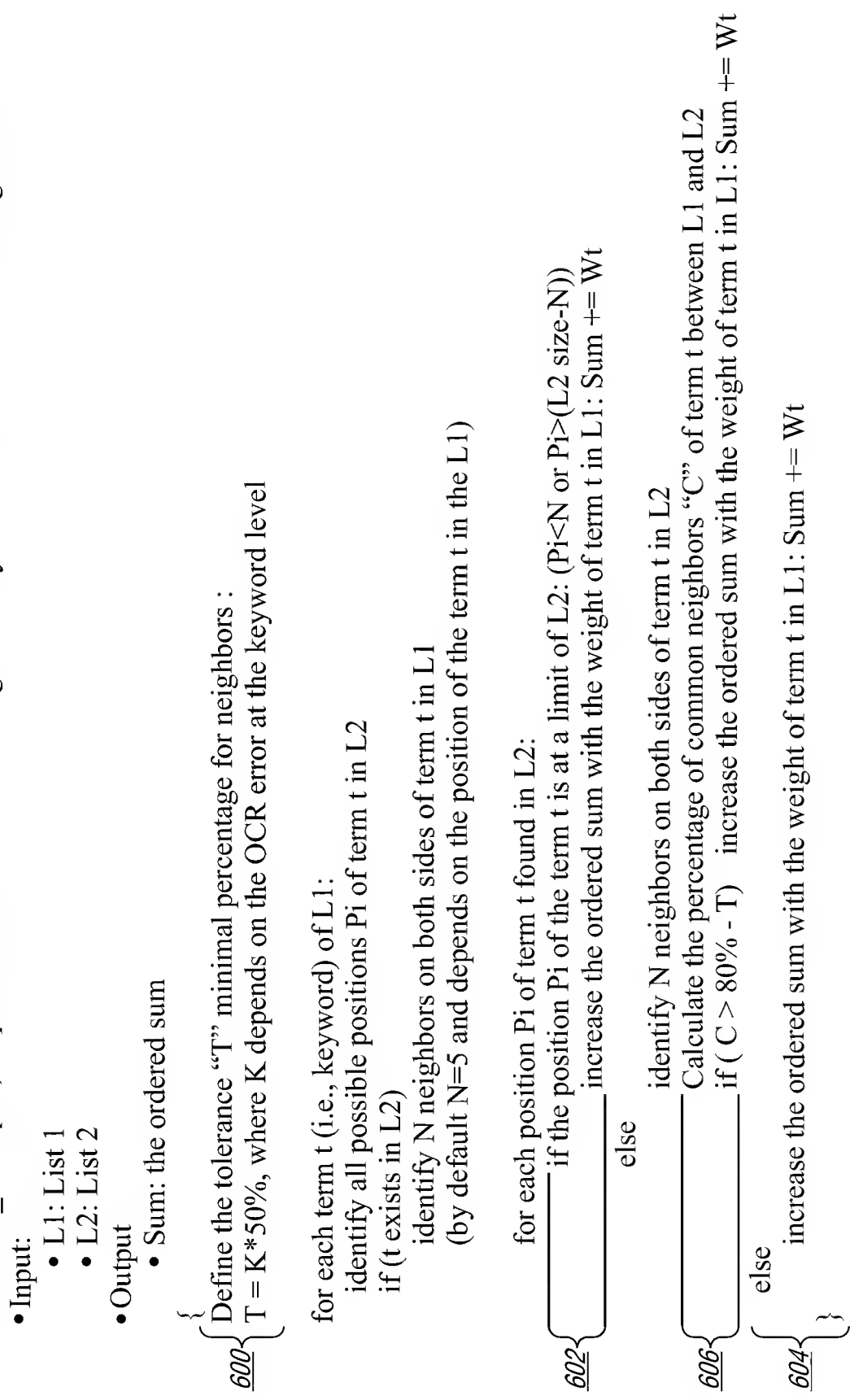


FIG. 7

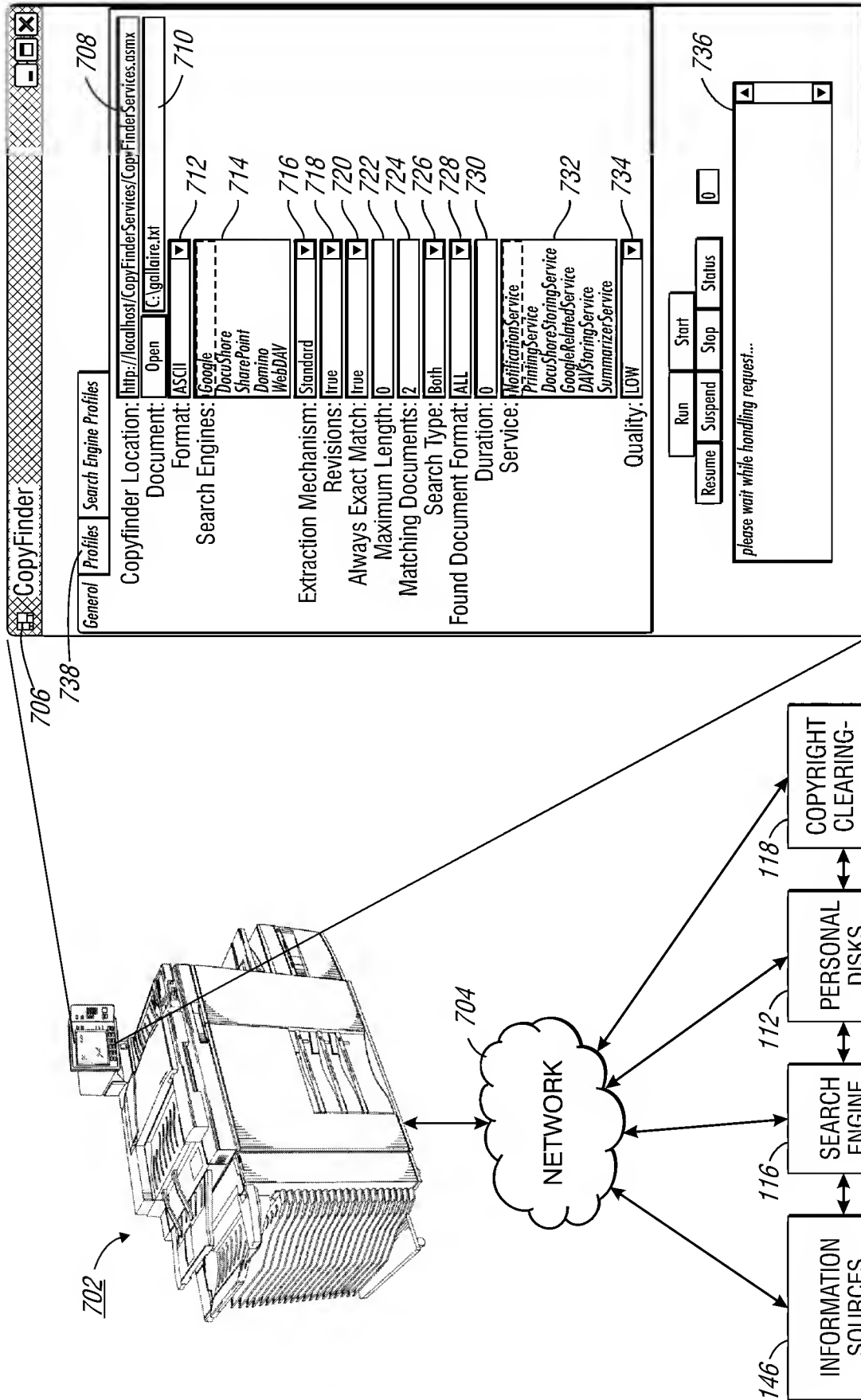


FIG. 8